CLAIMS:

1. A turbomachinery system for cooling a high power density device, comprising:

a turbomachine configured to deliver a high flux cooling medium, said turbomachine having a motor and a compressor driven by said motor;

a housing containing at least one of said motor and said compressor, said housing having a passage for air flow, an inlet at a first end for accepting air flow, and an outlet at a second end for discharging air flow;

a heat exchanger in fluid communication with said turbomachine and arranged for being thermally coupled to the high power density device; and

a transition duct arranged intermediate said heat exchanger and said inlet for funneling air flow from said heat exchanger to said turbomachine.

2. The system of Claim 1, wherein said heat exchanger comprises a porous medium having a plurality of interconnected flow paths.

3. The system of Claim 2, wherein said flow paths comprise an open-cell metallic foam or an open-cell non-metallic foam.

4. The system of Claim 3, wherein said porous medium comprises graphitized carbon foam, aluminum foam, copper foam, boron nitride foam, or any combination comprising at least one of the foregoing.

5. The system of Claim 2, wherein said heat exchanger further comprises:

a base thermally coupled to said porous medium, said base arranged for being thermally coupled to the high power density device.

6. The system of Claim 1, further comprising:

an audio sensor arranged for sensing noise generated at said turbomachine; and

a noise generating device responsive to said audio sensor and arranged for at least partially canceling the noise generated at said turbomachine.

7. The system of Claim 6, further comprising:

a control circuit arranged for receiving an input signal from said audio sensor and for sending an output signal to said noise generating device;

wherein said input signal is representative of the noise generated at said turbomachine, and said output signal is for generating a sound wave at said noise generating device that is phase-shifted with respect to the noise sensed at said audio sensor.

8. The system of Claim 7, wherein said phase-shifted sound wave is phase-shifted by about 180-degrees with respect to the primary tone sensed at said audio sensor.

9. The system of Claim 6, wherein said audio sensor and said noise generating device are disposed at said outlet.

10. The system of Claim 6, wherein said noise generating device comprises an audio speaker.

11. The system of Claim 10, wherein said audio speaker comprises an air mover comprising plastic, fiber, paper, metal, or any combination comprising at least one of the foregoing.

12. A method for cooling a high power density device, comprising:

drawing air through a porous medium using a turbomachine, the porous medium having a plurality of interconnected flow paths and arranged for being thermally coupled to the high power density device;

compressing the air at a turbocompressor of the turbomachine, the turbomachine having an overall dimension of equal to or less than 1U; and

exhausting the drawn and compressed air.

13. The method of Claim 12, further comprising:

sensing a noise generated at the turbomachine; and

generating a phase-shifted sound wave in response to the sensed noise for at least partially canceling the noise generated at the turbomachine.

14. The method of Claim 13, wherein:

said sensing a noise comprises sensing a noise at an exhaust of the turbomachine; and

said generating a phase-shifted sound wave comprises generating a phase-shifted sound wave at the exhaust of the turbomachine.

15. A method for cooling a high power density device, comprising:

drawing air through a heat exchanger using a turbomachine, the heat exchanger arranged for being thermally coupled to the high power density device;

compressing the air at a turbocompressor of the turbomachine, the turbomachine having an overall dimension of equal to or less than 1U;

sensing a noise generated at the turbomachine;

generating a phase-shifted sound wave in response to the sensed noise for at least partially canceling the noise generated at the turbomachine; and

exhausting the drawn, compressed, and noise-reduced air.

16. The method of Claim 15, further comprising:

receiving at a control circuit an input signal representative of the sensed noise and generating thereat an output signal phase-shifted from the input signal; and

sending the output signal to a noise generating device for generating a sound wave phase-shifted with respect to the sensed noise.

17. A turbomachinery system for cooling a high power density device, comprising:

a turbomachine configured to deliver a high flux cooling medium toward the high power density device, said turbomachine having a motor and a compressor driven by said motor;

a porous heat exchanger in fluid communication with said turbomachine and arranged for being thermally coupled to the high power density device;

an audio sensor arranged for sensing noise generated at said turbomachine; and

a noise generating device responsive to said audio sensor and arranged for at least partially cancelling the noise generated at said turbomachine.

18. The system of Claim 17, wherein said high flux cooling medium comprises air, refrigerant, or a combination comprising at least one of the foregoing.

19. The system of Claim 18, wherein said turbomachine has an overall dimension of equal to or less than 1U.

20. The system of Claim 19, wherein:

said porous heat exchanger comprises graphitized carbon foam, aluminum foam, copper foam, boron nitride foam, or any combination comprising at least one of the foregoing; and

said noise generating device comprises an air mover comprising plastic, fiber, paper, metal, or any combination comprising at least one of the foregoing.